

REMARKS

A. Background

Claims 6-16 were pending in the application at the time of the Office Action. The Office Action withdrew claims 6-10 as being directed to a non-elected invention. Claims 11-16 were rejected as being indefinite. Claims 11-16 were also rejected as being obvious over cited art. By this response Applicant has cancelled claims 6-10, amended claims 11-16, and added new claims 17-19. As such, claims 11-19 are presented for the Examiner's consideration in light of the following remarks.

B. Proposed Amendments

Claims 11-16 have been amended herein to further clarify, more clearly define, and/or broaden the claimed inventions to expedite receiving a notice of allowance. New claims 17-19 have also been added. These amendments to the claims are supported in the application at least by prior claim language, Figures 1 and 4, and pages 7, 11, 12, and 16 of the specification. In view of this, Applicant submits that the amendments to the claims do not introduce new matter and entry thereof is respectfully requested.

C. Indefiniteness Rejection

Paragraphs 3 and 4 of the Office Action reject claims 11-16 under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Generally, the Office Action asserts that the various means clauses in claim 11 are unclear and/or vague with respect to each other. In response, Applicant has reworded claim 11 to clarify that the means for imposing a magnetic

field and the means for applying the magnetic field correspond to the same one or more coils and that in imposing the magnetic field the one or more coils use the values determined by the means for determining amplitude and frequency values. Other grammatical amendments have also been set forth herein to further clarify the rejected claims. In view of this, Applicant respectfully submits that the rejection has been overcome and should be withdrawn.

D. Obviousness Rejection

Paragraphs 5 and 6 of the Office Action reject claims 11-16 under 35 USC § 103(a) as being unpatentable over U.S. Patent No. 5,240,569 to Waldron ("*Waldron*") in view of Publication No. XP-002265915 authored by Lukyanov et al. ("*Lukyanov*"). Applicant respectfully traverses this rejection and submits that the allegedly obvious combination would not include each and every limitation required by the rejected claims.

Waldron discloses an electrolysis cell system having a plurality of electrolysis cells. See Abstract and Figure 1. Each cell has an anode disposed atop the cell and a cathode disposed on the bottom of the cell, with the electrode surfaces of the anode and cathode being parallel to each other. See Abstract, Figure 1, and col. 3, lines 53-57. Because of this, "the current flow through the electrolysis cells is vertically downward." Col. 3, lines 52-53. This downward current flow causes a magnetic field to be induced on the cell that is "a circulating circumferential field in the clockwise direction." Col. 4, lines 49-53. That is, the direction of the magnetic field circulates around the cell and is parallel to the electrode surfaces. Because the current between the electrodes in conventional electrolysis cells is always in the same direction (top to bottom), the direction of the magnetic field induced by the current will also always be in a single direction, in this case a clockwise direction.

Waldron further discloses “a multi-turn radial toroidal coil” 66 that is wound around the outside of the electrolysis cell so as to produce an additional magnetic field. See col. 5, lines 47-49. *Waldron* discloses that the direction of current flow in the coil 66 is selected so that the induced additional magnetic field is “in the same direction as the field due to the electrolysis current” so that the total magnetic field will be elevated. See col. 5, lines 49-54. In other words, the additional magnetic field induced by the coils is also a field that circulates around the cell in a clockwise direction and is parallel to the electrode surfaces. See, e.g., “B” in Figure 3.

Waldron also discloses that in systems having a large group of cells, the coils on the cells can be energized in series. See col. 5, line 66 to col. 6, line 1. This implies turning the magnetic field on and off over time for any particular cell. Applicant notes that turning a magnetic field on and off is not the same thing as generating an alternating magnetic field. When turning the magnetic field on and off, the field is either in one direction or it is off; there is no changing directions of the field. In contrast, in an alternating magnetic field the field actually changes directions over time. Applicant can find no disclosure within *Waldron* of the magnetic field imposed on any of the cells changing directions. On the contrary, as noted above the only disclosure within *Waldron* regarding the direction of the additional magnetic current is that it is “in the same direction as the field due to the electrolysis current,” which is a clockwise direction.

As conceded by the Office Action, *Waldron* does not disclose a means for determining amplitude and frequency values to be used by the coils through wave reflection analysis on a theoretical wall whose parameters are sufficiently representative of said cell wall's parameters. To attempt to remedy this shortcoming of *Waldron*, the Office Action cites to *Lukyanov*. *Lukyanov* uses a wave reflection analysis of a typical electrolysis cell to quantify the instabilities that can occur in a two-layer conductive system. See Abstract. *Lukyanov* focuses on the cause

of the instabilities and does not disclose any methods or apparatus for overcoming the reported instabilities. As such, *Lukyanov* does not disclose or suggest “one or more coils,” “an external alternating magnetic field,” or “means for determining amplitude and frequency values of the magnetic field that are used by the one or more coils,” as recited in rejected claim 11. In fact, the only disclosure of a magnetic field within *Lukyanov* is the magnetic field induced by the typical current traveling between the anode and cathode on the electrolysis cell.

Thus, contrary to the assertion of the Office Action, *Lukyanov* does not cure the deficiencies of *Waldron*. That is, even if *Waldron* and *Lukyanov* were combined in the allegedly obvious manner set forth in the Office Action, the resulting combination would still not teach “one or more coils that impose on said cell an **external alternating magnetic field which varies dependent on time**” or “**means for determining amplitude and frequency values of the magnetic field**” that are used by the one or more coils in imposing the magnetic field on said cell,” as recited in amended claim 11. Accordingly, Applicant respectfully requests that the obviousness rejection with respect to claim 11 be withdrawn.

Claims 12-16 depend from claim 11 and thus incorporate the limitations thereof. As such, Applicant submits that claims 12-16 are distinguished over the cited art for at least the same reasons as discussed above with regard to claim 11. Accordingly, Applicant respectfully requests that the obviousness rejection with respect to claims 12-16 also be withdrawn.

Applicant further submits that many of the dependent claims are independently distinguished over the cited art. For example, claim 15 recites that the coils are positioned such that “the imposed magnetic field **is substantially vertical**.” However, as discussed above, *Waldron* only discloses a magnetic field that circulates in a clockwise manner and is parallel to the anode and cathode (i.e., in a horizontal direction), and *Lukyanov* fails to teach an imposed

external magnetic field. As such, the allegedly obvious combination of *Waldron* and *Lukyanov* would not teach the added limitation of claim 15.

Finally, Applicant submits that modifying *Waldron* by changing the external magnetic field to be an alternating field would be contrary to what one of skill in the art would think to do when trying to decrease instabilities in such a system. In fact, one of skill in the art would believe that by applying an alternating magnetic field the instability would actually increase rather than decrease. However, as shown in the detailed description of the application, the contrary is surprisingly achieved by applying the additional external alternating magnetic field to an electrolysis cell with the parameters as determined and by positioning the coils to apply the additional magnetic field as claimed.

No other objections or rejections are set forth in the Office Action.

E. New Claims

Applicant submits that new claims 17-19 are distinguished over the cited art of record. For example, dependent claim 17 recites various equations used in determining the amplitude and frequency values of the imposed magnetic field. Claim 18 recites “the means for determining amplitude and frequency values of the magnetic field comprises a mathematical model.” Finally, Claim 19 recites that the wave reflection analysis “is adapted to suit other geometries.” Applicant respectfully submits that the cited references do not teach or suggest these limitations.

In addition, new claims 17-19 depend from claim 11 and thus incorporate the limitations thereof. As such, Applicant submits that claims 17-19 are distinguished over the cited art for at least the same reasons discussed above regarding claim 11.

F. Conclusion

Applicant notes that this response does not discuss every reason why the claims of the present application are distinguished over the cited art. Most notably, applicant submits that many if not all of the dependent claims are independently distinguishable over the cited art. Applicant has merely submitted those arguments which it considers sufficient to clearly distinguish the claims over the cited art.

In view of the foregoing, applicant respectfully requests the Examiner's reconsideration and allowance of claims 11-19 as amended and presented herein.

In the event there remains any impediment to allowance of the claims which could be clarified in a telephonic interview, the Examiner is respectfully requested to initiate such an interview with the undersigned.

Dated this 20th day of February 2008.

Respectfully submitted,

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